DOCUMENT RESUME

ED 303 693 CE 052 017

TITLE Agricultural Mechanics and Basic Plant Science. Agricultural Mechanics and Basic Animal Science. An Administrative Guide for Agricultural Education.

INSTITUTION Henrico County Public Schools, Glen Allen, VA. Virginia Vocational Curriculum Center.

SPONS AGENCY Virginia State Dept. of Education, Richmond. Div. of Vocational and Adult Education.

PUB DATE 88

NOTE 109p.; For other guides in this series, see ED 301 671 and CE 052 018.

AVAILABLE FROM Virginia Vocational Curriculum and Resource Center, 2200 Mountain Road, Glen Allen, VA 23060-2208 ($5.91).

PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC05 Plus Postage.

DESCRIPTORS *Agricultural Education; *Agricultural Engineering; *Agronomy; *Animal Husbandry; Competency Based Education; Course Descriptions; Curriculum Guides; Secondary Education; *Vocational Education

ABSTRACT

This basic instructional guide for the first two years of instruction in agricultural education is one in a series of such guides. It is useful in developing and selecting instructional material and implementing competency-based education for two courses: agricultural science and basic plant science and agricultural science and basic animal science. These courses are introductory and basic in nature, and approximately half the courses are allotted to agricultural mechanics. Introductory materials include a listing of related Dictionary of Occupational Titles job titles and overview of the courses (definition, purposes, objectives, enrollment guidelines, occupational experience program, hours of instruction). Course descriptions and content outlines are then provided for each of the two courses. The content outline is matched with the corresponding task/competency code. Appendixes include recommended facility plans and inclusions and listings of references, audiovisual suppliers, and tools and equipment. (YLB)

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ED303693

Agricultural Mechanics and Basic Plant Science

Agricultural Mechanics and Basic Animal Science

An Administrative Guide for Agricultural Education

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AGRICULTURAL MECHANICS AND BASIC PLANT SCIENCE

AGRICULTURAL MECHANICS AND BASIC ANIMAL SCIENCE

An
Administrative Guide
for
Agricultural Education

Prepared by

Virginia Vocational Curriculum and Resource Center
Henrico County Public Schools
Department of Vocational and Community Education
Glen Allen, Virginia 23060

In Cooperation With

Agricultural Education Service
Vocational and Adult Education
Virginia Department of Education
Richmond, Virginia 23216

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1988

PREFACE

Agricultural education in the public secondary schools of Virginia is a broad-based elective program of instruction designed to meet the increasingly complex educational needs of those who will seek employment in the industry of agriculture.

The program includes education for prospective farmers and also for those who will be employed in off-farm occupations involving a knowledge of agricultural subjects.

The major objectives of vocational education in agriculture in the public schools of the state have been expanded to help prepare students for on-farm and off-farm agricultural occupations and to assist those who plan to continue agriculture education on the post-high school or university levels.

The courses in agricultural mechanics and the basic sciences provide students with a background of knowledge and skills that serve as a prerequisite for advanced agricultural course options.

This publication is one in a series and is designed as a basic instructional guide for the first two years of instruction in agricultural education.

S. John Davis
Superintendent of Public Instruction

ACKNOWLEDGMENTS

The contents of this administrative guide were extracted from the Agricultural Science and Mechanics I and II Task Analyses (1987), developed by the Agricultural Education Service, Virginia Department of Education.

Recognition is extended to the following people for their roles in planning, organizing, coordinating, and writing of this administrative guide.

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Appreciation is also expressed to Wickham B. Coleman, Supervisor, Agricultural Education Service, Virginia Department of Education, who served as administrative coordinator and provided invaluable assistance and advice.

Dr. Kay B. Brown, Supervisor, Vocational Curriculum Development, Virginia Department of Education, coordinated the final publication process. The editorial organization, revisions, and design format necessary to

prepare the guide for publication were performed by the Virginia Vocational Curriculum and Resource Center, administered by the Henrico County Public Schools, Department of Vocational and Community Education.

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INTRODUCTION

The first two years in the agricultural education curriculum are devoted to agricultural mechanics and basic plant and animal sciences. During this period, basic principles of the sciences, mathematics, and economics are reviewed, studied, and applied to agricultural situations. These two years of study provide much of the knowledge and many of the skills common to agriculture production and employment in off-farm agricultural industries and businesses.

These courses are introductory and basic in nature. The agricultural science part of the course relates to both rural and urban life. The life sciences deal with origins, structures, and functions of living things and include a study of the basic biological, earth, and social sciences.

Approximately half of the basic courses are allotted to agricultural mechanics and are designed to provide the student with instruction basic to occupations in which mechanical aptitudes, abilities, and skills are necessary. The students receive personal guidance and counseling, which will help them select the advanced course leading to entry-level employment in an agricultural occupation.

The Future Farmers of America (FFA) organization is an integral part of agricultural education. The primary purposes of the organization are the development of leadership, citizenship, and cooperation. These purposes are well suited to meet the needs of all students enrolled in agricultural education.

These courses cover the first two years in the agricultural education curriculum and are normally a prerequisite for entry into agricultural courses taught in the third, fourth, and fifth years. Time estimates in this

publication are to be used as a guide only.

W. Tommy Johnson
Associate Director
Agricultural Education

GUIDE APPLICATION

This administrative guide is based on the following Dictionary of Occupational Titles (DOT) job titles in the occupational domain of Agricultural Production:

DOT Job Title	DOT Code
All-Round Logger	454.684-018
Cash Grain Farmer	401.161-010
Christmas Tree Farm Manager	180.117-010
Diversified Crops Farmer	407.161-010
Diversified Crops Farmworker I	407.663-010
Farm and Garden Supplies Sales Representative	272.357-014
Farm Equipment Mechanic I	624.281-010
Farm Equipment Mechanic II	624.381-014
Farm General Manager	180.167-018
Farm Machine Operator	409.683-010
Feed Mixer	520.685-098
Fertilizer Mixer	550.665-018
Field Crop Farmer	404.161-010
Field Crop Farm Worker I	404.663-010
Field Crop Harvest Worker	404.687-014
Fish Hatchery Worker	446.684-010
Floral Designer	142.081-010
Flowers Salesperson	260.357-026
Forest Worker	452.687-010
Forester Aide	452.364-010
Fruit Farmworker I	403.683-010
General Farmer	421.161-010
General Farmworker II	421.687-010
Grain Farmworker I	401.683-010
Greenskeeper II	406.683-010
Horticultural and Nursery Products Salesperson	272.357-022
Horticultural-Specialty Farming Supervisor	405.131-010

DOT Job Title	DOT Code
Horticultural Worker I	405.684-014
Horticultural Worker II	405.687-014
Industrial-Commercial Groundskeeper	406.684-014
Inside Horticultural-Specialty Grower	405.161-018
Landscape Gardener	408.161-010
Landscape Laborer	408.687-014
Lawn-Service Worker	408.684-010
Machine Farmworker	409.686-010
Nursery Manager	180.167-042
Parks and Grounds-keeper	406.687-010
Parts Salesperson	279.357-062
Plant Propagator	405.361-010
Small Engine Mechanic	625.281-034
Soil Conservationist	040.061-054
Surveyor Helper	869.567-010
Tractor Mechanic	620.281-058
Tree-Fruit-and-Nut Crops Farmer	403.161-010
Tree Planter	452.687-018
Vegetable Farmer	402.161-010
Vegetable Farmworker I	402.663-010
Vegetable Harvest Worker	402.687-014
Vine-Fruit Crops Farmer	403.161-014

Therefore, the guide is useful in developing and selecting instructional material and implementing competency-based education for the following courses:

COURSES

Agricultural Science and Basic Plant Science
(VA Code: 8006)

Agricultural Science and Basic Animal Science
(VA Code: 8008)

Additional information concerning the application and use of this guide in program planning and development should be addressed to the following:

Agricultural Education Service
Vocational and Adult Education
Department of Education
P.O. Box 6Q
Richmond, Virginia 23216

OVERVIEW OF THE COURSES

Agricultural Mechanics and Basic Plant Science

Agricultural Mechanics and Basic Animal Science

I. DEFINITION

These courses are introductory and basic in nature and provide a background for success in agricultural occupations. Students develop basic skills and are provided guidance and counseling that will help them to select the advanced course option leading to entry-level employment in an agricultural occupation.

II. PURPOSES

A. To provide students with a science background that deals with origins, structures, and functions of living things and includes a basic study of earth, biological, and social sciences

B. To provide students with instruction basic to occupations in which mechanical aptitudes, abilities, and skills are necessary

C. To contribute to the fulfillment of the broad educational objectives set forth in the high school where this course is taught

III. OBJECTIVES

A. To develop a background for success in agricultural occupations

B. To develop a knowledge of agricultural option opportunities

III. OBJECTIVES

C. To develop leadership, citizenship, and cooperation by making FFA an integral part of agricultural education

D. To develop a knowledge of and plans for occupational experience

E. To develop skills, safe working habits, and attitudes

IV. ENROLLMENT GUIDELINES FOR STUDENTS

The two basic courses are designed for students in grades 8, 9, and 10. These courses are considered to be a prerequisite for enrollment in the Agricultural Education options.

V. OCCUPATIONAL EXPERIENCE PROGRAM

Each student is required to carry out a well planned and supervised occupational experience program as an integral part of the course expectations. Experiences may be provided in the school mechanics laboratory, on farms, in nearby farm businesses, or through a combination of these sources.

VI. HOURS OF INSTRUCTION

Each course needs 180 hours for completion with single periods per day allocated for class and/or laboratory instruction.

VII. ADVISORY GROUPS

Local advisory groups should be consulted relative to instruction in the various segments of the agricultural mechanics curriculum.

FUNDAMENTAL COURSES RELATIVE TO ALL AGRICULTURAL EDUCATION PROGRAMS

Agricultural Mechanics and Basic Plant Science
Agricultural Mechanics and Basic Animal Science

DESCRIPTION: Agricultural Mechanics and Basic Plant and Animal Science courses are introductory and basic in nature and provide a background for success in agricultural occupations. Students develop basic skills and are provided guidance and counseling that will help them to select the advanced course option leading to entry-level employment in an agricultural occupation. Basic principles of the sciences and economics are reviewed, studied, and applied to agricultural situations. These two years of study provide much of the knowledge and many of the skills common to agricultural production and employment in off-farm agricultural industries and businesses.

These courses cover the first two years in the agricultural education curriculum and are normally a prerequisite for entry into agricultural courses taught in the third, fourth, and fifth years. Schools that offer the third-, fourth-, and fifth-year programs without the first two years of agricultural mechanics and basic sciences must include the essential units of instruction from these basic courses within the course content of the specialized areas.

CIP CODE: 01.0301

SUGGESTED GRADE LEVEL: 8, 9, 10

PREREQUISITES: None

APPROVED COURSES	VA COURSE CODE	DOT CODE AND TITLE
*Agricultural Mechanics and Basic Plant Science	8006	(Refer to Guide Application section for list of all applicable DOTs for both courses.)
*Agricultural Mechanics and Basic Animal Science	8008	

*Required for all programs

AGRICULTURAL MECHANICS AND BASIC PLANT SCIENCE

COURSE DESCRIPTION: Agricultural Mechanics and Basic Plant Science is a one-year, single period, occupational preparation course usually offered at the eighth-or ninth-grade level. Approximately one-half of the course is devoted to agricultural mechanics, with emphasis placed on skill development in basic metals, tool fitting and cold metals, introduction to arc welding, sheet metal working, soldering and brazing, plan reading and sketching, and hand woodworking. The remainder of the course emphasizes the development of competencies in plant sciences, rural and urban living, leadership, and resource conservation.

PREREQUISITE: None

SUGGESTED GRADE LEVEL: 8, 9

AGRICULTURAL MECHANICS AND BASIC PLANT SCIENCE

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AGRICULTURAL MECHANICS AND BASIC ANIMAL SCIENCE

COURSE DESCRIPTION: Agricultural Mechanics and Basic Animal Science is a one-year, single period, occupational preparation course usually offered at the ninth-grade level. Approximately one-half of the course is devoted to agricultural mechanics, with emphasis placed on skill development in fundamentals of electricity, arc welding, gas cutting and welding, small engines, power woodworking, and wood and metal preservatives. Instruction is also provided in animal science and further development of competencies in rural and urban living, leadership, and resource conservation.

PREREQUISITE: Agricultural Mechanics and Basic Plant Science

SUGGESTED GRADE LEVEL: 9, 10

Note: When Agricultural Mechanics and Basic Plant Science is started in the ninth grade, Agricultural Mechanics and Basic Animal Science may be offered in the tenth grade, and only two years of an agricultural course option will be available at the eleventh-and twelfth-grade levels.

AGRICULTURAL MECHANICS AND BASIC ANIMAL SCIENCE

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CONTENT OUTLINE			TASK/COMPETENCY CODE
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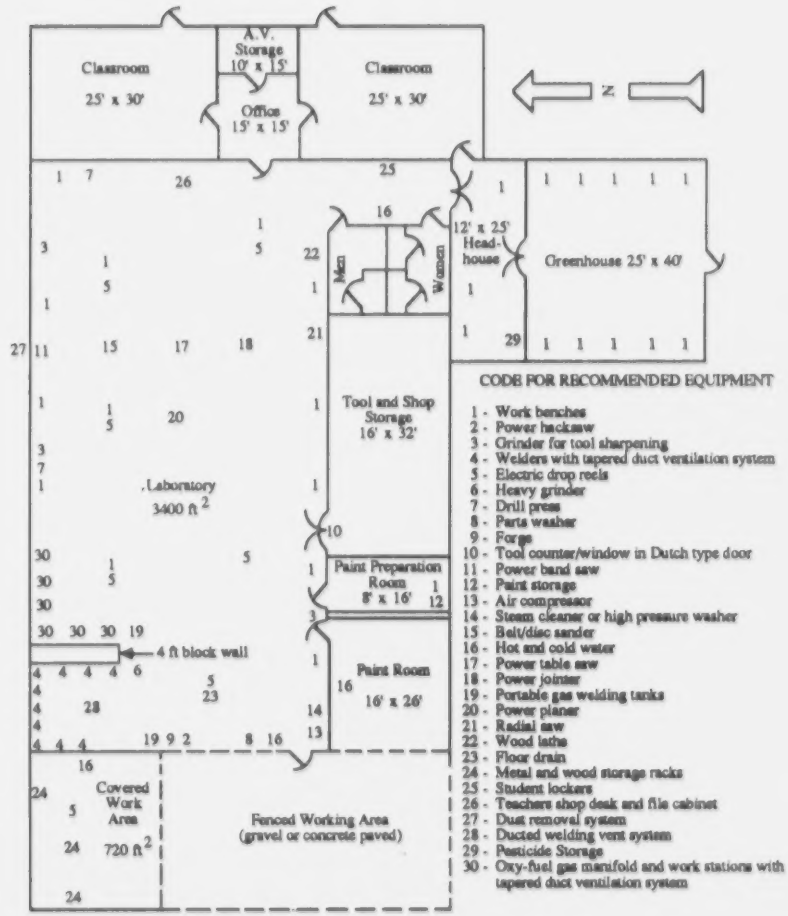
APPENDIX A

RECOMMENDED FACILITY PLANS AND INCLUSIONS


Classroom
25' x 30'
A.V. Storage
10' x 15'
Office
15' x 15'
Classroom
25' x 30'
N
12' x 25'
Head-house
Greenhouse 25' x 40'
Men
Women
Tool and Shop Storage
16' x 32'
Laboratory
3400 ft 2
Paint Preparation Room
8' x 16'
Paint Room
16' x 26'
4 ft block wall
Covered Work Area
720 ft 2
Fenced Working Area
(gravel or concrete paved)
CODE FOR RECOMMENDED EQUIPMENT
1 - Work benches
2 - Power hacksaw
3 - Grinder for tool sharpening
4 - Welders with tapered duct ventilation system
5 - Electric drop reels
6 - Heavy grinder
7 - Drill press
8 - Parts washer
9 - Forge
10 - Tool counter/window in Dutch type door
11 - Power band saw
12 - Paint storage
13 - Air compressor
14 - Steam cleaner or high pressure washer
15 - Belt/disc sander
16 - Hot and cold water
17 - Power table saw
18 - Power jointer
19 - Portable gas welding tanks
20 - Power planer
21 - Radial saw
22 - Wood lathe
23 - Floor drain
24 - Metal and wood storage racks
25 - Student lockers
26 - Teachers shop desk and file cabinet
27 - Dust removal system
28 - Ducted welding vent system
29 - Pesticide Storage
30 - Oxy-fuel gas manifold and work stations with tapered duct ventilation system

APPENDIX A (continued)

RECOMMENDED INCLUSIONS

Exhaust	- paint preparation room have exhaust fan and vented storage cabinet.
	- welding stations should be exhausted away from students using tapered duct ventilation system with drops to each welding station.
Floors	- laboratory floor be made of concrete with sufficient thickness to support weight of the heavest load the facility will encounter. All concrete floors should be sealed.
Shop drain	- drain be provided with drainage into a settling basin.
Wash area	- exterior concrete wash area be provided with drainage into a settling basin.
Walls	- height of walls 16' minimum or dictated by machinery size.
	- be treated with epoxy paint or equivalent material for cleaning purposes. Treated area should be minimum of 7' high.
	- color be light, example yellow, white, etc.
Doors	- equipment entrance doors be 16' wide and 14' high.
	- exterior passage way doors be provided adjacent to equipment entrance doors.

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Doors (continued)	-	parts storage and tool-storage room doors be 42" wide or a double door.
Electrical Service	-	minimum of 600 AMP service be provided.
	-	master shut-off switch be provided.
	-	ground fault interrupters be wired into circuitry.
	-	welding outlet be provided at laboratory center and rear entrance as well as in welding areas.
Heat	-	have provisions for independent heat control for the laboratory.
Lighting	-	general lighting requirements for the laboratory 50-100 foot candles.
Loading Ramp	-	be provided and located outside the fenced-in area with 360° access.
Hot Water	-	be provided in hand-washing and equipment-cleaning areas.
Compressed Air	-	outlets be located at 40' intervals around exterior walls.
	-	compressor be located in out-of-the-way storage area if possible.
Safety Glasses	-	storage and sanitary cabinet be located at the primary student entrance area of the laboratory.
Roof Strength	-	roof trusses should be of sufficient strength to support chain hoists and other equipment for lifting agricultural equipment.

APPENDIX B

REFERENCES

AC Welder. Huntington, West Virginia: J. S. Latta, Inc.

Advisor's Guide to the Student Handbook. Alexandria, Virginia: National FFA Supply Service, 1984.

Agricultural Career Opportunities. Richmond, Virginia: Virginia Department of Agriculture and Consumer Services.

Agricultural Education Service Area Resource. Richmond, Virginia: Virginia Department of Education, 1984.

Agricultural Mechanics Plans. St. Paul, Minnesota: Hobar Publications.

Agricultural Mechanics Plans for Shop Projects. Columbia, Missouri: Instructional Materials Laboratory.

Agricultural Proficiency Awards Handbook. Alexandria, Virginia: National FFA Supply Service.

Agricultural Safety. Moline, Illinois: John Deere Service Training.

Air, Soil and Water Handbook. Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1981.

Applying Pesticides: Management, Application, Safety. Athens, Georgia: American Association for Vocational Instructional Materials,* 1980.

---

*The American Association for Vocational Instructional Materials is abbreviated throughout the bibliography as AAVIM.

Barber, C. L. Solder...Its Fundamentals and Usage. 3rd ed. Chicago, Illinois: Kester Solder Company, 1965.

Basic Drafting: Book Two. Stillwater, Oklahoma: Mid-America Vocational Curriculum Consortium, Inc., 1981.

Baudendistle, Robert F. Horticulture: A Basic Awareness. 2nd ed. Reston, Virginia: Reston Publishing Company, Inc., 1982.

Bear, Forrest W., and Hoerner, Thomas A. Planning, Organizing, and Teaching Agricultural Mechanics. Revised ed. St. Paul, Minnesota: Hobar Publications, 1980.

The Beginning of a Landscape Plan (reprint). Blacksburg, Virginia: Virginia Cooperative Extension Service, March, 1978.

Bender, R. E. et al. The FFA and You. 3rd ed. Danville, Illinois: Interstate Printers and Publishers, 1979.

Binkley, Harold R., and Byers, Clark W. Handbook on Student Organizations in Vocational Education. Danville, Illinois: Interstate Printers and Publishers.

Blueprint Reading Basics: Group 1, Basics. St. Paul, Minnesota: Hobar Publications.

Blueprint Reading Basics: Group 2, Orthographic Projections. St. Paul, Minnesota: Hobar Publications.

Blueprint Reading for Welders. St Paul, Minnesota: Hobar Publications.

Brickbauer, E. A., and Mortensen, W. P. Approved Practices in Crop Production. 2nd ed. Danville, Illinois: Interstate Printers and Publishers, 1978.

Bulletin #4. Alexandria, Virginia: National FFA Supply Service.

Carburetor Laboratory (#404). St. Paul, Minnesota: Hobar Publications.

A Catalog of Performance Objectives, Criterion-Referenced Measures, and Performance Guides for Machine Shop. Atlanta, Georgia: Vocational Technical Education Consortium of States, Occupational Research Coordinating Unit, Georgia Department of Education.

A Catalog of Performance Objectives, Criterion-Referenced Measures, and Performance Guides for Plumbing. Jackson, Mississippi: Vocational-Technical Education Consortium of States, Mississippi Department of Education.

A Catalog of Tasks, Performance Objectives, Performance Guides, Tools, and Equipment for Building Repairer. Charleston, West Virginia: Vocational Technical Education Consortium of States, West Virginia Department of Education.

A Catalog of Tasks, Performance Objectives, Performance Guides, Tools, and Equipment for Crop Production--Farmer. Columbia, South Carolina: Vocational-Technical Education Consortium of States, South Carolina Department of Education, 1981.

A Catalog of Tasks, Performance Objectives, Performance Guides, Tools, and Equipment for Crop Production--Vegetable Grower. Columbia, South Carolina: Vocational-Technical Education Consortium of States, South Carolina Department of Education, 1981.

Checking Tractor Safety. (Learning Activity Package). Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1983.

Concrete Improvements for Farm and Home. Urbana, Illinois: Vocational Agricultural Service, College of Agriculture, University of Illinois.

Conduct a Community Survey (Module A-2). Athens, Georgia: AAVIM.

Conserving Soil. Washington, D.C.: Soil Conservation Service, U.S. Department of Agriculture.

Cooper, Elmer. Agricultural Mechanics: Fundamentals and Application. Albany, New York: Delmar Publishers, Inc., 1988.

Crunkilton, John. Practices for Conducting an Effective Agricultural Laboratory Program. Richmond, Virginia: Virginia Department of Education.

Currence, H.D. and McFate, K.L. Agricultural Wiring Handbook. Columbia, Missouri: National Food and Energy Council, Inc.

Developing Shop Safety Skills. Athens, Georgia: AAVIM, 1981.

Developing Shop Safety Skills: Teacher's Guide. Athens, Georgia: AAVIM, 1979.

Diagraming Electrical Wiring (LAP-AMS 4). Richmond, Virginia: Virginia Department of Education.

Dictionary of Occupational Titles. Washington, D.C.: Employment and Training Administration, U.S. Department of Labor (current edition).

Doane's Farm Management Guide. St. Louis, Missouri: Doane Agricultural Service, Inc.

Electric Motors: Selection/Protection/Drives. Athens, Georgia: AAVIM, 1982.

Electrical Wiring--Residential Utility Buildings and Service Areas: Teacher's Guide. Athens, Georgia: AAVIM, 1983.

Electricity and Wheels. Detroit, Michigan: General Motors Corporation, 1953.

Electricity: Demonstration for the Electrical Teaching Center. Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1980.

Employer's Guide for Training Employed Tractor Operators. Blacksburg, Virginia: Virginia Polytechnic Institute and State University Extension Division, May, 1976.

Energy Conservation in the Rural Home: How to Determine Your Insulation Needs. Blacksburg, Virginia: Virginia Cooperative Extension Service, 1980.

Ensminger, M.E. Animal Science. 8th ed. Danville, Illinois: Interstate Printers and Publishers, 1983.

Equine Management and Production. Stillwater, Oklahoma: State Department of Vocational and Technical Education, 1980.

Ensminger, M.E. The Stockman's Handbook (Animal Agriculture Series). Danville, Illinois: Interstate Printers and Publishers, 1983.

Exploratory Agriculture: A Curriculum Guide for Agricultural Education. Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1983.

Farm Energy Analysis. Columbia, Missouri: National Food and Energy Council, 1983.

The Farmer and Wildlife Habitat Improvement Guide. Washington, D.C.: Wildlife Management Institute.

Fastening with Wood Screws (Learning Activity Package). Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1983.

Feeding Animals (Lesson Plan for Vocational Agriculture). Richmond, Virginia: Virginia Department of Education, 1960.

Fertilizer Programs for Maintaining Kentucky Bluegrass, Tall Fescue, Perrennial Bluegrass, and Fine Fescue Lawns (#430-168). Blacksburg, Virginia: Virginia Cooperative Extension Service, March, 1982.

FFA Leadership and Personal Development. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service.

Finishing Wood Furniture (Publication 291). Blacksburg, Virginia: Virginia Cooperative Extension Service, 1980.

Forest Trees of Virginia (Publication 26). Charlottesville, Virginia: Virginia Division of Forestry, 1985.

Forestry in Agricultural Education in Virginia (Revised). Richmond Virginia: Agricultural Education Service, Virginia Department of Education, 1985.

Fregley, Bert. How to Get a Job. Homewood, Illinois: ETC Publications, 1974.

Fundamentals of Service: Engines, Compact Equipment. Moline, Illinois: John Deere Service Publications, 1971.

Fundamentals of Service: Shop Tools. Moline, Illinois: John Deere Service Publications, 1971.

Fuels and Lubricants: Selecting, Conserving, Storing. Athens, Georgia: AAVIM, 1983.

Gillespie, James R. Modern Livestock and Poultry Production. 2nd ed. Albany, New York: Delmar Publishers, Inc., 1983.

Godbey, Frank W. Occupational Safety and Health in Vocational Education: A Guide for Administrators, Faculty, and Staff. Cincinnati, Ohio: U.S. Department of Health, Education, and Welfare, 1979.

Groneman, C.H., and Glazener, E.R. Technical Woodworking. 2nd ed. New York, New York: McGraw-Hill, 1976.

Guide for the Beginning Gardener (Publication 836). Blacksburg, Virginia: Virginia Cooperative Extension Service, September, 1979.

A Guide for Using the Forestry Conservation Lesson Material. Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1980.

A Handbook of Agronomy (Publication 424-100). Blacksburg, Virginia: Virginia Cooperative Extension Service, September, 1984.

Handbook: Supervised Occupational Experience. Alexandria, Virginia: National FFA Supply Service.

Hedden, J. Plumbing for Old and New Homes. Passaic, New Jersey: Creative Homeowner Press, 1981.

Hoover, N.K. Handbook of Agricultural Occupations. Danville, Illinois: Interstate Printers and Publishers.

How to Read Shop Drawings. Cleveland, Ohio: The Lincoln Electric Company, 1961.

Identifying Fertilizer Ingredients. Rochester, New York: Singer Career Systems.

Identifying Plant Symbols Used in Landscape Designs (Learning Activity Package). Richmond, Virginia: Virginia Department of Education, 1983.

Illustrated Horticulture, Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1985.

Ingels, J.E. Landscaping Principles and Practices, 2nd ed. Albany, New York: Delmar Publishers, 1983.

Inside of Arc Welding. Milwaukee, Wisconsin: A.D. Smith Corporation.

Invite Wildlife to Your Back Yard: Planning Guide. Washington, D.C.: National Wildlife Federation.

Irvin, D.W. Power Tool Maintenance. New York, New York: McGraw-Hill, 1971.

Jurgenson, E.M. Handbook of Livestock Equipment. 2nd ed. Danville, Illinois: Interstate Printers and Publishers, 1979.

Keily, H.J., and Walters, R.G. How to Find and Apply for a Job. 2nd ed. Cincinnati, Ohio: Southwestern Publishing Company, 1960.

Knebel, Earl H., and Richardson, William. Terminology in Agricultural Education. Athens, Georgia: AAVIM, 1982.

Laboratory Safety Handbook: A Guide to Laboratory Safety Practices for Virginia Agricultural Education Students in Grades 7-12. Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1981.

Lawn Fertilization in Virginia (Publication 430-011). Blacksburg, Virginia: Virginia Cooperative Extension Service, August, 1984.

Lawn Mower Safety (Publication 52). Blacksburg, Virginia: Virginia Cooperative Extension Service, September, 1978.

Lawn Weed Control (Publication 427-045). Blacksburg, Virginia: Virginia Cooperative Extension Service, April , 1985.

Lietzke, D.A., et al. Land Appreciation and Soil Evaluation in Virginia. Blacksburg, Virginia: Virginia Polytechnic Institute and State University, 1979.

Machinery Management: Fundamentals of Machine Operation. 2nd ed. Moline, Illinois: Deere and Company, 1981.

Magneto Ignition Kit (#400). St. Paul, Minnesota: Hobar Publications.

Malpiedi, J.B., and Crunkilton, J.R. A Resource Manual for First-Year Vocational Agricultural Teachers in Virginia. Blacksburg, Virginia: Agricultural Education, Virginia Polytechnic Institute and State University, June, 1984.

Measuring Workbook (#19169). St. Paul, Minnesota: Hobar Publications.

The Metal Craftsman's Handbook: An Illustrated Dictionary of Metalworking. Athens, Georgia: AAVIM, 1980.

Metcalf, D.S., and Elkins, D.M. Crop Production, Principles and Practices. 4th ed. New York, New York: Macmillan, 1980.

Micrometers, Calipers, and Gauges (#169). St. Paul, Minnesota: Hobar Publications.

Miller, L.E. Physical Features of Soil (AP-10). Blacksburg, Virginia: Virginia Polytechnic Institute and State University, 1979.

Miller, L.E. What is Soil? (AP-9). Blacksburg, Virginia: Virginia Polytechnic Institute and State University, 1979.

Modern Plans for Modern Farms. Chicago, Illinois: Portland Cement Association.

Occupational Outlook Handbook. Washington, D.C.: Bureau of Labor Statistics, U.S. Department of Labor, 1980.

Official FFA Manual (current edition). Alexandria, Virginia: National FFA Supply Service.

Our American Land: Yearbook of Agriculture. Washington, D. C.: U. S. Department of Agriculture, 1987.

Oxyacetylene Welding (Unit 4). Warrington, Pennsylvania: DCA Educational Products.

Oxyacetylene Welding, Cutting and Brazing. Troy, Ohio: Hobart School of Welding Technology, 1976.

Paints and Preservatives. Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1975.

Phipps, Lloyd J. Handbook on Agricultural Education in Public Schools. Danville, Illinois: Interstate Printers and Publishers.

Phipps, Lloyd J. Mechanics in Agriculture. 3rd ed. Danville, Illinois: Interstate Printers and Publishers, 1983.

A Planning Guide for Agricultural Education Programs in Virginia Public Schools. Richmond, Virginia: Virginia Department of Education, 1981.

Planning and Locating the Garden: Virginia Home Food Production Fact Sheet (MH 312). Blacksburg, Virginia: Virginia Cooperative Extension Service, January, 1979.

Plant Growth Factors: Exploring the World of Plants and Soils. Blacksburg, Virginia: Virginia Cooperative Extension Service.

Plant Reproduction: Exploring the World of Plants and Soils. Blacksburg, Virginia: Virginia Cooperative Extension Service.

Planting: Fundamentals of Machine Operation. Moline, Illinois: Deere and Company, 1981.

Plywood Encyclopedia. Tacoma, Washington: American Plywood Association, November, 1978.

Plywood Grades and Applications. Tacoma, Washington: American Plywood Association, December, 1979.

Pork Industry Handbook. Blacksburg, Virginia: Virginia Cooperative Extension Service, 1984.

Preservative Treatment of Post, Timber, and Lumber (General Report SA-GR2). Atlanta, Georgia: U.S. Department of Agriculture, Forest Service, 1978.

Preventive Maintenance. 3rd ed. Moline, Illinois: John Deere Service Training.

Providing for Energy Efficiency in Homes and Small Buildings, Part III. Oak Ridge, Tennessee: U.S. Department of Energy, Technical Information Center, 1980.

Pynnonen, Arthur. Vocational Agriculture Student Farm Shop Manual. Shelton, Wisconsin: National VO-AG Book Company.

Recommended Practices for Building with Concrete Masonry. Urbana, Illinois: Vocational Agricultural Service, College of Agriculture, University of Illinois.

Reily, H.E., and Shry, C.L., Jr. Introductory Horticulture. 3rd ed. Albany, New York: Delmar Publishers, Inc., 1988.

Richard, C.E. Soils: Testing Soil (Publication AP-8). Blacksburg, Virginia: Virginia Polytechnic Institute and State University, 1972.

Richter, H.P., and Schwan, W.G. Practical Electrical Wiring. 13th ed. New York, New York: McGraw-Hill, 1984.

Residential Wiring. Stillwater, Oklahoma: Mid-America Vocational Curriculum Consortium, 1983.

97

Robert, S.C. Robert's Rules of Order. New York, New York: Pyramid Publications, (current edition).

Roth, A.C., and Baird, R.J. Small Gas Engines: Fundamentals, Service, Troubleshooting, Repairs. South Holland, Illinois: Goodheart-Wilcox, 1981.

Rules and Regulations of the Federal Communications Commission, Sub-part D (004-000-00427-2). Washington, D.C.: U.S. Government Printing Office.

Safe Tractor Care. Athens, Georgia: AAVIM, 1981.

Selecting Garden Equipment: Virginia Home Food Production Fact Sheet (NH 315). Blacksburg, Virginia: Virginia Cooperative Extension Service, September, 1979.

Selecting Plant Seed (Learning Activity Package). Richmond, Virginia: Agricultural Education Service, Virginia Department of Education, 1983.

Service and Repair Instructions. Milwaukee, Wisconsin: Briggs and Stratton Corporation.

Shinn, G.C., and Weston, C.R. Working in Agricultural Mechanics: Activity Guide and Project Plan Book. New York, New York: McGraw-Hill, 1978.

Shop Equipment Safety and Operation. (Teachers' Manual). Blacksburg, Virginia: Virginia Polytechnic Institute and State University.

Shop Tools and Procedures. Columbus, Ohio: Agricultural Education Curriculum Materials Service, Ohio State University.

Small Engines, Vol. 1: Care and Operation. Athens, Georgia: AAVIM, 1979.

Smith, E.S. Checklist for Winterizing and Maintaining Machinery (Publication 628). Blacksburg, Virginia: Agricultural Engineering Department, Virginia Polytechnic Institute and State University, 1977.

Smith, H.P., and Wilkes, L.H. Farm Machinery and Equipment. 6th ed. New York, New York: McGraw-Hill, 1976.

Soil Preparation: Virginia Home Food Production Fact Sheet (426-313). Blacksburg, Virginia: Virginia Cooperative Extension Service, January, 1982.

Stanley Tool Guide. New Britain, Connecticut: Stanley Tools, 1979.

Successful Tree Planting (Publication #70). Charlottesville, Virginia: Virginia Division of Forestry, 1978.

Summary of Virginia Game Laws (current year). Richmond, Virginia: Commission of Game and Inland Fisheries.

Supervised Occupational Experience in Agricultural Education: Plans and Records. Danville, Illinois: Interstate Printers and Publishers.

SOE Handbook. Alexandria, Virginia: National FFA Supply Service.

Taking Soil Samples (Learning Activity Package). Agricultural Education Service, Virginia Department of Education.

Terminology in Agricultural Education. Athens, Georgia: AAVIM, 1982.

Terraces...A Best Management Practice (Publication 390-408). Blacksburg, Virginia: Virginia Cooperative Extension Service, October, 1981.

Tillage: Fundamentals of Machine Operation. 2nd ed. Moline, Illinois: Deere and Company, 1976.

Tips and Ideas that Make Painting Easier (18). Home Center Institute of National Hardware Associations, 1976 (available free from major hardware stores).

Training in Basic Shielded Metal--Arc Welding (workbook EW-269; SMAW 13). Troy, Ohio: Hobart School of Welding Technology.

Understanding the Agribusiness Concept. Richmond, Virginia: Agricultural Education Service, Virginia Department of Education.

Understanding Electricity and Electrical Terms. Athens, Georgia: AAVIM, 1981.

Unwinding a Tree: The Story of Plywood. Tacoma, Washington: American Plywood Association.

Vegetable Seed Handbook (current edition). Richmond, Virginia: Southern States Cooperative, Inc.

Virginia Beef Cow-Calf Handbook. Blacksburg, Virginia: Virginia Cooperative Extension Service, 1981.

Virginia FFA Activity Handbook. Richmond, Virginia: Virginia Department of Education, 1985.

Virginia Master Gardeners Handbook. (Publication 426-600). Blacksburg, Virginia: Virginia Cooperative Extension Service, January, 1985.

Virginia Pest Control Guide (Publication 456-001). Blacksburg, Virginia: Virginia Cooperative Extension Service.

Virginia View (Career Information System). Blacksburg, Virginia: Virginia Polytechnic Institute and State University (1-800-542-5870; may be available in local library).

Vocational Agriculture Education: Basic Core Curriculum I. Stillwater, Oklahoma: Oklahoma State Board of Vocational and Technical Education, 1974.

Vocational Agriculture Education II: A Curriculum Guide. Stillwater, Oklahoma: Oklahoma State Board of Vocational and Technical Education. 1975.

Vocational Trade and Industrial Education -- Welding. Stillwater, Oklahoma: Oklahoma State Board of Vocational and Technical Education, 1974.

VO-AG Welding Project Plans (39 plans). Urbana, Illinois: Vocational Agricultural Service, University of Illinois.

Wakeman, T.J. Modern Agricultural Mechanics. Danville, Illinois: Interstate Printers and Publishers, 1977.

Welding. Stillwater, Oklahoma: Oklahoma State Board of Vocational and Technical Education, 1974.

Wildlife Conservation in Virginia. Seattle, Washington: Outdoor Empire Publishing, Inc., 1985.

Wildlife of Farm and Field: Illustrated Survey. Washington, D.C.: National Wildlife Federation.

You and Forest Fires. Washington, D.C.: U.S. Government Printing Office, August, 1978.

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APPENDIX C

AUDIOVISUAL SUPPLIERS

Agri-Farm Productions, Inc.
1019 Market Street
Box 43
Gowrie, Illinois 50503

Bergwall Productions, Inc.
Box 238
Garden City, New York 11530-0238

Briggs and Stratton Corporation
Box 702
Milwaukee, Wisconsin 53201

DCA Educational Products
424 Valley Road
Warrington, Pennsylvania 18946

Future Farmers of America
National FFA Supply Service
5632 Mt. Vernon Memorial Highway
Alexandria, Virginia 22309

Hobar Publications
1234 Teller Road
St. Paul, Minnesota 55112

Mid-America Vocational Curriculum Consortium
1500 West 7th Avenue
Stillwater, Oklahoma 74074-4364

NASCO
901 Janesville Avenue
Fort Atkinson, Wisconsin 53538

Research and Curriculum Unit
Vocational and Technical Education
Mississippi State University
Mississippi State, Mississippi 37962

Teaching Aids
Box 1798
Costa Mesa, California 92626-0728

Vernard Films, Ltd.
Box 1332
Peoria, Illinois 61654

Vocational Agricultural Service
University of Illinois
434 Mumford Hall
Urbana, Illinois 61801

Virginia Department of Education
Audiovisual Services
Box 6Q
Richmond, Virginia 23216

Virginia Cooperative Extension Service
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061

Vocational Education Productions
California Polytechnic State University
San Luis Obispo, California 93407

West Virginia Vocational Curriculum Laboratory
West Virginia University
Charleston, West Virginia 25301

APPENDIX D

TOOLS AND EQUIPMENT

Adding machine
Adjustable metal stands
Air compressor
Anvil w/stand
Application software
Battery charger
Battery charger accessories
Battery service kits
Battery starter tester
Battery testers
Benches, metal work
Benches, portable metal workbench
Bits, drill, sets
Bookcase
Box, mitre
Branding sets
Building, storage (small aluminum siding)
Bushing inserter and remover
Cabinets, storage
Calculator
Caliper (sets)
Camera
Cement mixer
Chairs
Chalkboard
Chisels, cold (set)
Chisels, wood (set)
Clamps "C" (set)
Cleaner, steam or high pressure
Cold frames
Copy machines for transparencies
Cultivators
Current indicator
Desk, office
Desk, secretary
Desk, teacher
Disk drive
Diskettes
Display racks and showcases
Dividers (set)
Drawing set

Drill bits (set)
Drill presses w/accessories
Drill presses, wood and metal
Drill, hand electric
Drill, portable
Drop spreader
Duplicator, mimeograph
Dust collection system
Dust particle removing system
Electric clippers
Electric groomer
Electrical kits
Electrical teaching cabinet
Engine repair stand
Engines, small gasoline
Engraver, electric
Engraving tool
Extinguishers, fire
Farm level, telescopic and tripod
File basket
File cabinet
Files w/handles (set)
Filmstrip and record player comb.
Fume removal system
Furnace, heat treating
General hand tool sets
Grass shears
Greenhouse benches
Greenhouse pot moving carts
Grinder, compost
Grinders, portable and pedestal
Ground fault interrupter
Hacksaws, power
Heating tables w/thermostats
Hollow punches (set)
Hoses with reel
Hot beds
Ignition tester
Incandescent photoperiod lights
Jack, hydraulic
Jointer
Ladder, 20 ft., 200 lb. rated
Ladder, step
Lathe house
Lathe, wood w/tools and plates

Lawn edger/trimmers
Lawn roller
Lawn vacuum
Lettering equipment for signs
Levels (surveyor)
Livestock chute
Livestock scale
Lubrication equipment
Manuals
Map and chart file
Masonry hand tools (set)
Microcomputer
Micrometers (set)
Microscopes
Microscopes, binocular
Models
Modem
Monitor
Monitor, safety glasses
Movie projector
Mowers
Overhead projectors
Painting equipment
Parts bin
Parts washer
Pipe threaders (set)
Planer
Plows
Portable floor crane
Postage scale
Press, arbor
Press, hydraulic
Printer
Projection screen
Projection table
Rack, magazines
Rake
Rear projection screen
Record player
Recorder, tape
Recorder, video
Reference books
Reference manuals
Riveting tools
Riveting tools, rex riveting machine

Rotary tiller
Safety shields
Sander, portable
Sander, disc
Saw, radial arm
Saw, band wood
Saw, metal power hack
Saw, portable circular
Saw, tilting arbor
Shear, lever
Shear, metal cutting
Sickle bar tools
Simulator
Slide and filmstrip projector
Slide projector
Slide sets
Small engine stands
Small engine tools
Soldering and sheet metal hand tools (set)
Sprayers
Sprayers, paint
Spreaders, lime
Stamping sets
Standard paper cutter
Stool, machinists work
Student tables (desks)
Styrofoam cutter
T.V. monitor
Tacker-stapler
Tamper
Tap and die (set)
Tattoo set
Teacher station
Telephones
Testers, circuit
Time clock
Tire tools
Torches, carbon arc
Torque wrenches (set)
Tractor maintenance hand tools (set)
Tractor w/equipment
Transparency sets
Truck
Typewriter
Vacuum cleaner

Vice, machinists
Vice, pipe
Video tape recorder
Vices, wood, metal and pipe
Welders, arc
Welders, mig
Welders, oxygen - acetylene
Welders, spot
Welders, tig
Welding booth
Welding screen
Welding stool
Welding table
Welding, accessories
Welding, cylinder truck
Wheelbarrow
Woodworking hand tools (set)
Workbenches, wood and metal
Wrenches, including open end, box end, combination, socket, and allen (sets)
Wrenches, pipe, external (set)
Wrenches, pipe, internal (set)
*Cabinets, tool storage
*Cabinets, mobile tool
*Panels, tool
*Boards, tool assortment

*Includes woodworking, metal working, masonry, tool fitting, electrical, small engine tools, etc.

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